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RESEARCH PAPER

Nexuses between Global Technologies and Educational Outcomes of University Students in Punjab, Pakistan

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ABSTRACT

In the contemporary world, no dimension of the world lives long without the aid of technology. The same is valid for education and educational institutions. The spread of Covid-19 forces the world to go online. Before the pandemic, European and developed countries utilized educational technologies; however, developing countries like Pakistan adopted major educational technologies during COVID-19. This study deals with the impact of educational technologies on the educational outcomes of students in selected universities in Punjab, Pakistan. The researcher focused on students' viewpoints since they are the potential source of information selected as the target sample, and because the emphasis was on students' comprehension of the role of global educational technology in determining the educational outcome. The researcher used a disproportionate stratified sampling technique in this study as it entails categorizing a population into groups (strata) and selecting a sample that is not proportional to the size of each category. The researcher utilized a qualitative approach for this research. Data were collected using an interview guide, respectively. Students and educational institutions utilize educational technologies which yield good results. These technologies improve education, and students learn new and up-to-date knowledge due to the intervention of technology.

Keywords: Educational Outcomes, Global Technologies, Public Universities, University Students

Introduction

Every aspect of life has been impacted by technology, including politics, the economy, society, culture, morals, and beliefs. It has altered our thought processes as well as our viewpoints and perceptions. Numerous accessories in life provide us with advantages, such as improved information. It was solely due to technology. While we're talking about other aspects of life, we also need to consider how technology has improved schooling. When compared to students in pre-technical eras, students in the technology era receive a lot more help. For example, a student can explore the problem of cultural relativism and the adaptability of the American democratic system through research, thanks to technology (Winegar & Kritt, 2009).

Technology has customized learning in the modern educational system. Multiple sites and tools are available online to help the instructor communicate his ideas to the students. Moreover, students can also learn from these online sites and tools besides the classroom. Modern technology is virtual instructors and classrooms. It has multiple advantages of portability and accessibility (Fischer, 1962). Thus, in the current educational system, an instructor at the school is not the only option for learning and getting exposed to ideas; many instructors also exist. Unprecedented access to information and learning tools has revolutionized the educational system beyond the imagination of human beings (Harbeck, 2015). The COVID pandemic has added the significance of online and

technological tools for educational activities to continue. New technological advancement was necessitated, and demand for more advanced technology was created. Corona pandemic has shown educational system and modern technology were handed in gloves helping each other to flourish and grow.

Literature Review

Modern technology has also created a digital divide, and with advancement, it is increasing (Komoski, 2009). For example, countries that need more technological advancement or internet access can compete with other countries. They need to catch up in the so-called age of progress and technology. They are not taking any advantage of the technological revolution of the modern world. Thus, the digital divide also plays an important role in the educational system. Some nations need access to other nations' information and tools. Besides, modern technology is also a tool to rule and promote your narrative.

Muffoletto (1994) argued that technological developments should be used in a way that would increase the proficiency of students. Technology should focus on enhancing the skills of the student. Engaging students in very productive activities has become possible in the modern age. In his ground-breaking work, *Understanding Media*, McLuhan (1964) tried to explain how media work and how technology shapes culture. After his death, his son Eric McLuhan worked on McLuhan's ideas and formulated four media laws (McLuhan & McLuhan, 1988). These laws are said to be the most anti-fragile and elastic that these laws could be applied to almost anything, including things, ideas, and theories: The only condition of using these laws is that the thing, theory, or idea should be the production of human (McLuhan & McLuhan, 1988; Iseri &Logan, 2016). Moreover, these laws are not just simple statements as looked upon first reading; according to Harman (2009), McLuhan's laws of media are his metaphysical position to locate society between so-called scientific laws. Although sometimes considered technology conservative (Havers, 2003), McLuhan was a forward-looking man who rightly predicted the '*world wide web'* and coined the '*global village*' (McLuhan, 1962 and McLuhan, 1966). McLuhan (1962) insists that technology shapes human beings as the invention of the first printing press dehumanized human beings by shifting them from hearing to seeing. Now Seeing is believing, and before it was, hearing was thinking (Grodsky et al., 2018). According to McLuhan and McLuhan (1988), laws of media are four simple statements that express outer social reality; e., any artefact (media or technology) creates four functions simultaneously.

The 21st century is the century of online education (Zakaria, 2021); therefore, the trend of Massive Open Online Courses (MOOC) is on the rise. Although there has yet to be a consensus on the proper definition of MOOC, providing online-campus free education is primary to MOOC (Saadatdoost et al, 2015). Mazoue (2013) fears that MOOC culture is seriously challenging the old traditional mode of education. Students can easily learn from MOOCs and not need to visit campus physically anymore. A similar thread is also felt by other scholars such as Schuwer et al, 2015. However, due to some inbuilt limitations, (Schuwer et al., 2015) argued that MOOC is a product of the USA, and language and socio-political hindrances prevent the widespread MOOC across European countries. The MOOC movement is beneficial for some segments of the population (students) and harmful for others. Nevertheless, the culture of MOOC is on the rise, and in distance learning, it is the "big thing" of our age. Furthermore, Knox (2014) stated that MOOCs had become a culture and experiment in teaching pedagogies, unfolding new dimensions of learning and teaching. Another feature of MOOC is its inclusive nature and novel education possibilities for small groups, marginal groups, and those who are deprived or cannot visit campus physically for specific reasons (Mackness et al, 2013). The experiment of MOOC, after the USA, remains more successful in Russia where, probably, due to extensive land and a single language, the scope of MOOC yielded positive results in the domain of Arts and Humanities and Technical skills (Larionova, 2018).

As there are some inbuild threats of MOOC, such as threats to traditional education, threats to higher education, and pedagogical challenges, recent studies tried to explore new ways to improve MOOC to remove potential hazards and make it easy to use, student-friendly, and align it with higher education (Sandeen, 2013). Now degrees and professional certificate courses are being offered via MOOC along with facilities of the traditional-based educational system. Saadatdoost et al., (2015) claimed that MOOC is on the rise because it gives certificates for skills that the majority already have, and they need verified credentials. The study also recommends that there is a need to investigate the relationship between MOOC community building because MOOC brings together all segments of society. For instance, it is evident that MOOC benefits marginalized communities and poor segments of society; thus, it is a democracy enhancer as well (Dillahunt et al., 2014). Teaching is essential to MOOCs, and outcomes are subject to scholarly interpretation. Garcia-Penalvoa et al., (2018) showed that there are more than one dimension of MOOC and more than one type of MOOC. Each class is peculiar with specific demands and peculiarly offers certain skills. MOOCs faced a sharp rise in 2018. Interestingly, at the peak point of MOOCs, the COVID-19 pandemic emerged, and the world witnessed the importance of MOOCs and online learning.

Chen et al., 2007 developed (DVREMS) a desktop-based virtual reality earth motion system to facilitate students of geography. Similar developments are on the rise in developed countries. Nevertheless, the exact definition of virtual reality still needs to be included. In psychology, it is different from Computer Science and so on. Virtual reality is an online mode of teaching, pedagogy, learning, and engaging for educational purposes. Interestingly, some scholars spent three decades investigating virtual reality's use in education and concluded it is destructive. For instance, Psotka (1995) was a pioneer in this domain, and after two decades of research and teaching, he declared it a dangerous technology for education (Psotka, 2013).

Buheji & Ahmed (2020) explored the dynamics of teaching with Zoom, a “new normal” after the pandemic. It is argued that although online teaching has some drawbacks, multidisciplinary research should be done to mitigate these factors to prepare students for the labour market. In this regard, hybrid mode and Educational Social Networks could become the best alternatives. Nevertheless, the researcher did not mention the procedure of the hybrid teaching mechanism. However, Alfadda & Mahdi (2021) studied students’ language learning on Zoom with the Technology Acceptance Model (TAM). They found a positive relationship between the educational use of Zoom and the commercial use of Zoom. Furthermore, the study argued that there is no difference in gender regarding language learning on Zoom. This means that Zoom can provide better quality education and potentially be utilized for educational purposes at a greater level. Nevertheless, another study on 31 Western universities argued that students perceive learning on Zoom negatively (Serhan,2020).

Similarly, another survey of 350 colleges stated that students face several issues while attending class/lecture over Zoom: issues like internet interruptions, camera adjustment, unnecessary notifications, and audio-visual problems are natural hindrances. The study suggests that arranging cameras for students can reduce this problem, that they can feel that they are actively engaged in the lecture (Peper et al., 2021). Furthermore, students prefer pre-recorded video lectures over live Zoom lectures due to the flexibility of pre-recorded video lectures and the clarity of the content (Islam et al., 2020). Though the reason(s) for students’ negative responses have not yet been explored thoroughly, Ohnigian et al., (2021) argued that the unavailability of best practices regarding learning on Zoom might be the hindrance. The study suggests that during Zoom sessions ensuring students’ active participation and debriefing after the session could enhance learning interest. The case of faculty is similar as well. Vandenberg & Magnuson (2021) claimed that the faculty of the nursing college and students prefer campus-based physical classrooms over Zoom lectures. In this regard, educational policymakers should work for the future of education

as the online mode is becoming a new normal (Buheji & Ahmed, 2020). These hindrances have been investigated carefully as well. Dangi & Saat (2021) argued that although the Technology Acceptance Model is old and has been updated occasionally, it is still workable.

Correcting the intentions of students, TAC (Zoom) can provide quality education; at least, this is true for the students of accounting. Universities that adopted well-managed e-learning tools and provided training to students before the start of formal classes did best compared to universities that just launched online courses without proper planning (Alameri et al., 2021). Moreover, Katz & Kedem-Yemini (2021) recognize the problem of learning on Zoom and suggest that the communication skills of teachers and students can reduce problems of online learning through Zoom. Another problem is the perception of students (Nuraziza et al., 2021). Usually, students perceive the problems of Zoom shall pass slowly, but practically, they face more and more problems with time. This affects their long-term behaviour regarding learning with Zoom.

Material and Methods

University students and faculty members were the target demographic, and Punjab was the research universe. The researcher focused on students' viewpoints since they are the potential source of information selected as the target sample, and because the emphasis was on students' comprehension of the role of global educational technology in determining the educational outcome. The province was split into four sections or areas, and four universities were chosen from each region after the researcher mapped all of the universities in the province. The researcher used a disproportionate stratified sampling technique in this study as it entails categorising a population into groups (strata) and selecting a sample that is not proportional to the size of each category (Cochran, 1977). The researcher planned to interview fifteen people from each university for a qualitative study. Nevertheless, the researcher performed 39 interviews despite having little time and resources as well as reluctance from the respondents. The researcher made sure that both male and female respondents participated equally. Thematic analysis was used to analyse data at the group level. These themes were then applied to the acquired data to derive relevant insights. The identified themes are presented with interpretations based on the original data.

Results ad Discussion

The most significant themes from the research findings are explained below. The themes are presented together with explanations based on the original data. Table 1 below discusses the five major themes or codes that arose from the data:

Table 1
List of the main themes, supporting themes, and instances of how respondents defined these themes.

No.	Themes	Sub-themes	Words Respondents Used to Describe
1.	Access to Information and Learning Resources	i. Online Libraries and Resources	Online databases, e-books, academic websites
		ii. E-learning Platforms	Virtual classes, online tutorials, educational apps
2.	Global Collaboration and Knowledge Exchange	i. International Student Interaction	Cultural exchange, diverse perspectives
		ii. Global Classroom Environment	Connecting with global educators, global projects
3.	Technological Challenges and Adaptability	i. Technical Infrastructure	Internet connectivity, device availability

		ii. Adaptation to New Technologies	Learning curve, tech proficiency, software mastery
4.	Impact on Educational Quality and Skill Development	i. Enhancing Learning Outcomes	Improved understanding, skill enhancement
		ii. Skill Relevance and Industry Alignment	Job market alignment, practical skill development
5.	Influence on Teaching Methodologies and Assessment	i. Innovative Teaching Techniques	Virtual labs, interactive methods, gamification
		ii. Altered Assessment Strategies	Online exams, diverse evaluation methods

Access to Information and Learning Resources: Respondents underlined the importance of information and learning resource access, emphasising the vital role of online libraries, resources such as databases and e-books, and university websites in facilitating research and learning. One of the respondents said, "*Access to online databases and e-books has greatly expanded our research scope, making knowledge more accessible.*" The literature highlights the transformative effect of technology on information availability. The concept of "every aspect of life has been impacted by technology" corresponds to the theme of increased access to online libraries, databases, and academic websites. Winegar and Kritt (2009) emphasise the importance of technology in assisting students in conducting online research on complicated themes like cultural relativism and democratic systems.

Global Collaboration and Knowledge Exchange: Cultural interaction and exposure to various points of view have been identified as critical components of a global educational environment. Respondent responded, "*Exposure to international literature has broadened my academic horizons, bringing useful insights into many points of view.*" The literature supports the concept of global collaboration enabled by technology. Dixon et al. (2010) underline the advantages for students, emphasising the worldwide community, ongoing access to scientific literature, and global event updates. Google Scholar is recognised as a valuable resource that connects academicians all over the world, aligning with the theme of global collaboration and knowledge exchange.

Technological Challenges and Adaptability: The study also looked into technology barriers and flexibility, providing insight into technical infrastructure difficulties. The availability of devices and Internet connectivity were identified as important factors influencing adaptation to new technologies. Respondents expressed worries, with one noting, "*Problems with internet connectivity have occasionally hampered our smooth shift to online learning, negatively influencing the overall learning experience.*" While the literature does not directly address technological difficulties in education, the fact that technology affects all parts of life indicates challenges and the need for adaptation. Buheji and Ahmed's (2020) study on the dynamics of teaching with Zoom in the "new normal" after the pandemic validates the topic of technological obstacles and flexibility in education.

Impact on Educational Quality and Skill Development: Respondents underlined enhanced learning outcomes, with global technology integration ascribed to advances in comprehension and skill development. Another respondent expressed, " *Learning has become more engaging as a result of the usage of educational tools, which has improved my knowledge of complex subjects.*" Notably, a determined attempt was made to combine educational techniques with job market demands, with a focus on the development of practical skills relevant to industrial needs. According to an applicant, the "curriculum is now more aligned with industry needs, emphasising practical skills that enhance our employability.". The utilisation of digital copies, according to Dixon et al. (2010), represents the improved learning outcomes revealed in the theme analysis. The emphasis on

completing academic materials quickly while ensuring source authenticity aligns with the concept of influence on educational quality.

Influence on Teaching Methodologies and Assessment: Virtual labs, interactive approaches, and gamification have emerged as popular instructional concepts. Another respondent stated, " *By using virtual labs and interactive methodologies, students' learning experiences have become more engaging.*" The transition to online exams and other evaluation approaches revealed the transformative impact of technological advances on assessment strategies in the educational landscape. By proposing a desktop-based virtual reality earth motion system for geography students, Chen et al. (2007) illustrated the evolving nature of teaching approaches. Furthermore, Alfadda and Mahdi's (2021) study on language learning on Zoom lends credence to the topic of technology's impact on teaching methodologies and evaluation procedures.

To shape the educational achievements of university students in Pakistan, global technology must be used at a broader level. Highly qualified professionals who completed their studies abroad have claimed that their inability to apply and transfer their overseas learning to improve student outcomes is due to the lack of global technologies and research facilities in Pakistan as compared to the developed countries (Hassan et al., 2021). Students can also gain soft skills in addition to formal schooling by employing global technologies. Soft skills are abilities that people possess or gain throughout their lives. These abilities differ from those gained through formal education and training. Individuals get these non-formal learning experiences from their family, friends, and society (Mahmood, 2017).

Conclusion

The current study discusses the impact of technological-based education in Punjab, Pakistan and its impact on students' education. The 21st century is the century of online education (Zakaria, 2020); therefore, the trend of Massive Open Online Courses (MOOC) is rising. Mazoue (2013) fears that MOOC culture is seriously challenging the old traditional mode of education. Nevertheless, the culture of MOOC is on the rise, and in distance learning, it is the "big thing" of our age. The present study concludes that the research explored the revolutionary influence of international technologies on academic achievements at Punjabi public institutions, scrutinising several aspects of the relationship between technology and learning. It emphasised the widespread influence of technology in all sectors of life, laying the groundwork for further investigation of its specific impact on education. The literature review emphasised the benefits of digital technology in education, as evidenced by the availability of knowledge via online resources and platforms such as Google Scholar. It also highlighted opposing viewpoints, such as reservations about using virtual reality in education. In this study, a disproportionate stratified sampling procedure was used to target university students and faculty members in Punjab. The study gathered numerous perspectives from many regions, resulting in a thorough grasp of the impact of global educational technology in determining educational results. The research uncovered five major themes: access to information and learning resources, worldwide collaboration and knowledge exchange, technological obstacles and flexibility, impact on educational quality and skill development, and impact on teaching approaches and assessment. Respondents underlined the value of online libraries, e-books, and e-learning platforms, emphasising their impact on research and learning. The issue of global collaboration rang true throughout the literature, confirming the enriching impacts of international student engagement and the importance of technology in establishing a global educational environment.

Concerns regarding internet access and gadget availability revealed technological constraints and flexibility, coinciding with literature that addressed the obstacles faced by technology, particularly in the context of online education. The impact on educational quality and skill development emerged as a central theme, with respondents attributing

enhanced learning outcomes and skill augmentation to global technology integration. This finding is consistent with the research, which acknowledges technology's positive impact on education, particularly in terms of accessibility and increased learning experiences. Furthermore, the intentional alignment of educational methods with labour market requirements and the development of practical skills reflected the literature's emphasis on preparing students for real-world issues. The influence on teaching methodology and assessment strategies topic revealed the adoption of innovative techniques such as virtual labs, interactive methods, and gamification, representing the changing landscape of educational practices.

Recommendations

To improve education, invest in greater internet connectivity and device accessibility for smooth online learning. Continuous educator training in current instructional technology should be prioritised. Improve student and faculty access to online resources. Promote cross-cultural learning, global projects, and international student engagement to enrich the educational environment. Encourage investigation into online teaching problems, hybrid learning, and Educational Social Networks. Proactively monitor the impact of technology on education and change teaching approaches as needed.

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